

REMARKS

This responds to the Advisory Action mailed on March 29, 2005.

Claim 1 is amended, no claims are canceled, and no claims are added; as a result, claims 1, 5-6, 9-12, 14-15, 17-22 and 31-33 are now pending in this application.

The Advisory Action states that “a desired F profile can be obtained through routine experimentation” and points to column 42, lines 4-8 and column 41 lines 29-42 of Mitani. Applicant respectfully disagrees. The cited portions of Mitani apparently call for the growth and use of a fluorine doped silicon dioxide film at operating conditions of less than 1 Torr pressure and from 600 to 1050 deg C temperatures for up to an hour. Applicant respectfully submits that the Office Action is incorrect in stating that there is any disclosure in Mitani of creating a fluorine profile at a temperature of 300 deg C. Instead, the cited temperature in Mitani is the anneal temperature after the creation of a “fluorine-containing silicon oxide film” (see col. 41, line 38). Applicant reiterates the belief that such a series of conditions or operations with the device of the “AAPA” would destroy the device, as explained in Applicant’s previous response. Applicant believes that the present specification indicates this point at least at page 11, line 21 where it states that it “is preferred to have fluorine present in a low enough concentration such that HF is not produced” so that it will not “begin to etch gate dielectric layer 14”. This issue is again raised in the present application at page 13, lines 1-5. In fact, the need to keep the fluorine concentration down to a low level is repeated throughout the present specification. The nitrogen fluoride concentrations in Mitani are simply stated to be “a gas mixture of oxygen and NF₃” as may be seen at col. 41, lines 14-15, and at line 30. There are other generic mixtures of nitrogen fluoride with nitrogen or hydrogen in Mitani, but nothing that Applicant can find to indicate that any problem with destruction of the devices may occur if the fluorine level is allowed to go too high.

Applicant respectfully submits that there is no disclosure or suggestion in Mitani related to the use of a halogen incorporated in the various dielectric layers and other structures to resist the cross contamination of volatilized metal during metal etch or operational use. Instead,

Mitani is apparently directed to improving the dielectric breakdown strength and the reliability of the insulating films.

§103 Rejection of the Claims

Claims 1, 5, 6, 9-12, 14, and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over “Applicant’s Admitted Prior Art (AAPA)” and Mitani et al. (U.S. patent No. 6,191,463). Applicant respectfully traverses this rejection.

Mitani apparently discloses a polysilicon gate structure over a gate dielectric having no barrier layer or metal layer gate stack as recited in the present claims. Mitani discloses exposing the polysilicon film 222 to a gas mixture of oxygen and NF_3 at 600 to 1000 °C at 10 mTorr to 1 Torr pressures. (See Mitani at column 41, lines 14-16 and lines 28-31.) If a structure such as disclosed in the “AAPA” were subjected to such treatment, Applicant believes that the metal layer would oxidize or vaporize, thus destroying the device. Mitani does not worry about this since there is no metal layer to be concerned about in Mitani. Therefore, there is no possible motivation to one of ordinary skill in the art to combine Mitani with the “AAPA.” Applicant believes that the high level of the fluorine gas in Mitani would result in etching of the gate oxide 214 in those portions of the gate oxide not covered by the poly gate 222, as expressly noted in the present application and above. This is incompatible with the “AAPA” device, which as noted in Figure 5 and on page 12 of the present application, has repaired the sidewalls and edge of the gate stack (such as, for an illustrative example, the poly “smile” 30 and sidewall 28). Thus, Applicant respectfully submits that Mitani, whether taken alone or in any combination with the “AAPA,” would result in a non-functional device. Therefore, Applicant submits that the suggested combination of references is thus inappropriate.

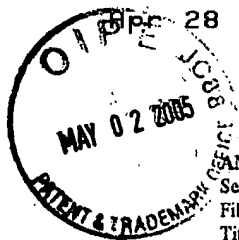
Specifically, Applicant respectfully submits that independent claim 1, as amended herein, is neither described nor suggested by the suggested combination of references, which do not suggest “...oxidizing the patterned gate stack under conditions that reduce redeposition of the metal film on the substrate and on the gate stack of a volatilized portion of the metal film ...” as recited herein. There is no gate stack or metal film in Mitani. The other claims are believed patentable for similar reasons. Therefore, Applicant respectfully requests that this rejection be reconsidered and withdrawn.

Claims 17-22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over “Applicant’s Admitted Prior Art (AAPA)” and Mitani et al, as applied to claims 1, 5, 6, 9-12, 14, and 15 above, and further in view of Cunningham (U.S. Patent No. 6,479,362). Applicant respectfully traverses this rejection.

The cited references of the “AAPA” and Mitani have been discussed above. Cunningham is apparently used to show that the use of polysilicon sidewalls and metal nitride barrier layers in a polycide gate is known. Applicant respectfully submits that Cunningham does nothing to cure the above noted failures of the “AAPA” and Mitani references to provide any motivation to make the suggested combination. Applicant respectfully submits that the suggested combination of references does not provide proper motivation to make the suggested combination, and requests that this rejection be reconsidered and withdrawn.

Claims 31-33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over “Applicant’s Admitted Prior Art (AAPA)” and Mitani et al, as applied to claims 1, 5, 6, 9-12, 14, and 15 above, and further in view of Jain et al. (U.S. Patent No. 6,613,682). The cited references of the “AAPA” and Mitani have been discussed above. Jain apparently discloses halogen-containing gases during gate patterning to remove a temporary coating. Jain apparently has a dielectric anti-reflective coating (“DARC”) that needs to be removed during gate electrode etching, due to the dielectric nature of the DARC adversely affecting device performance.

Applicant respectfully submits that Jain does nothing to cure the failures of the suggested combination of the “AAPA” and Mitani, as discussed above, to provide a motivation to make the suggested combination. Applicant respectfully submits that the suggested combination of references does not provide proper motivation to make the suggested combination, and requests that this rejection be reconsidered and withdrawn.



AMENDMENT AND RESPONSE UNDER 37 CFR § 1.116 – EXPEDITED PROCEDURE

Serial Number: 09/945,553

Filing Date: August 30, 2001

Title: METHOD TO CHEMICALLY REMOVE METAL IMPURITIES FROM POLYCIDAL GATE SIDEWALLS

Page 11

Dkt: 303.775US1

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney, David Suhl, at (508) 865-8211 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

FERNANDO GONZALEZ ET AL.

By their Representatives,

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(508) 865-8211

Date

4/28/05

By

David Suhl

David Suhl

Reg. No. 43,169

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop RCE, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 28 day of April, 2005.

Tina Kohut

Name

Z-4A

Signature